CLAIMS

1. A metal base circuit board to be use for a hybrid integrated circuit, comprising circuits provided on a metal plate via an insulating layer (A, B), a power semiconductor mounted on the circuit and a control semiconductor to control the power semiconductor, provided on the circuit, wherein a low capacitance portion is embedded under a circuit portion (pad portion) on which the control semiconductor is mounted.

2. The metal base circuit board according to Claim 1, wherein the low capacitance portion is made of a resin containing an inorganic filler and has a dielectric constant of from 2 to 9.

3. The metal base circuit board according to Claim 1 or 2, wherein the thickness of the low capacitance portion is from 100 to 1,000 μm.

4. The metal base circuit board according to Claim 3, wherein the circuit portion (pad portion) on which the control semiconductor is mounted is provided on the low capacitance portion embedded in the metal plate via the insulating layer (B).

5. A process for producing a metal base circuit board, which comprises:

(1) a step of filling concaves of a metal plate having concave portions on one principal plane, with a substance to form a low capacitance portion to the same level of height as the surface of an insulating layer (A),

to form a plate provided with a low capacitance member,

(2) a step of providing an insulating layer (B) made of a resin containing an inorganic filler on the surface of the low capacitance portion and the insulating layer (A) of the plate provided with a low capacitance member to form a board provided with a low capacitance member,

(3) a step of providing a metal foil on the surface of the insulating layer (B) of the board provided with a low capacitance member to form a metal assembly, and

(4) a step of processing the metal foil of the metal assembly to form circuits, including forming a circuit portion (pad portion) on which a control semiconductor is to be mounted from the metal foil located at least at the surface of the low capacitance portion.

6. The process for producing a metal base circuit board according to Claim 5, wherein the metal plate having concave portions on one principal plane is prepared by

(a) a step of providing the insulating layer (A) made of a resin containing an inorganic filler on a desired position of the principal plane of the metal plate, and

(b) a step of etching the metal plate employing the insulating layer (A) as a mask to form the concave portions on the surface of the metal plate.

7. A metal base circuit board comprising circuits provided on a metal plate via an insulating layer, wherein a dent portion is provided on one side of the metal plate in such a state that the circumferential

portion thereof is not opened, and insulating layers made of the same material are provided both on the space of the dent portion and on the metal plate on which the dent portion is present.

8. The metal base circuit board according to Claim 7, wherein the maximum depth of the dent portion is from 10 to 50% of the thickness of the metal plate, the size of the dent portion as viewed from the vertical direction is at least 50% of the area of the metal plate, and in a shape of the dent portion as viewed from the vertical direction, the corner has a curvature radius of at least 2.5 mm.

9. The metal base circuit board according to Claim 7 or 8, wherein the insulating layers are made of a resin containing an inorganic filler, and the resin composition after cured has a storage elastic modulus of at most 15,000 MPa at 300 K.

10. A metal base circuit board to be used for a hybrid integrated circuit, comprising a metal plate, an insulating layer provided on the metal plate, circuits provided on the insulating layer and a plurality of semiconductors mounted on the circuits, wherein a low dielectric constant portion is provided on the metal plate under a part of the circuits on which no semiconductor is mounted.

11. The metal base circuit board according to Claim 10, wherein the low dielectric constant portion is formed by

providing a dent portion on the surface of the metal plate and filling the dent portion with a resin containing an inorganic filler.

12. The metal base circuit board according to Claim 11, wherein the side wall of the dent portion has a gradient of from 35 to 65°.

13. The metal base circuit board according to Claim 11 or 12, wherein the inorganic filler is made of fused silica (silicon dioxide), and the fused silica comprises from 3.5 to 45.0 vol% of particles having an average particle size of from 0.3 to 5.0 μm and from 18.0 to 80.0 vol% of particles having an average particle size of from 6 to 30 μm.

14. A metal base circuit board to be used for a hybrid integrated circuit, comprising a metal plate, an insulating layer provided on the metal plate, circuits provided on the insulating layer and a plurality of semiconductors mounted on the circuits, wherein dent portions are provided on the surface of the metal plate under a part of the circuits on which no semiconductor is mounted, the dent portions are filled with a resin containing an inorganic filler, and the corner portion of the dent portions as viewed from the vertical direction has a curvature radius of at least 0.4 mm.

15. The metal base circuit board according to Claim 14, wherein the inorganic filler is made of fused silica (silicon dioxide), and the fused silica comprises from

3.5 to 45.0 vol% of particles having an average particle size of from 0.3 to 5.0 μm and from 18.0 to 80.0 vol% of particles having an average particle size of from 6 to 30 μm.

16. A process for producing a metal base circuit board to be used for a hybrid integrated circuit, comprising a metal plate, an insulating layer provided on the metal plate, circuits provided on the insulating layer, a power semiconductor mounted on the circuit and a control semiconductor to control the power semiconductor, provided on the circuit, which comprises (1) a step of forming concave portions on the principal plane at the side where the insulating layer is provided on the metal plate, (2) a step of applying an insulating adhesive to the concave portions and the metal plate at a portion other than the concave portions to the same level of height, (3) a step of providing a metal foil on the surface of the insulating adhesive and curing the insulating adhesive to form a metal assembly, and (4) a step of processing the metal foil of the metal assembly to form circuits.

17. A metal base circuit board obtained by the process for producing a metal base circuit board as defined in Claim 16, wherein the insulating adhesive is made of a resin containing an inorganic filler and has a coefficient of thermal conductivity after cured of at least 1.3 W/mK.

18. The metal base circuit board according to Claim 17, wherein the capacitance per unit area between the metal plate and the circuit on the concave portion filled with the insulating adhesive is at most 50 pF/cm^2, and the capacitance per unit area between the metal plate and the circuit at a portion other than the above is at least 50 pF/cm^2 and at most 160 pF/cm^2.